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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,230	06/16/2006	Fabien Frederic Jousse	T7106(C)	8226

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EXAMINER

KWAK, DEAN P

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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01/07/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/583,230	Applicant(s) JOUSSE, FABIEN FREDERIC	
	Examiner Dean Kwak	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,5 and 7-14 is/are pending in the application.
- 4a) Of the above claim(s) 7-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,13 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/17/2009 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 4, 5, 13 & 14 are rejected under 35 U.S.C. 112, first paragraph, because the specification does not reasonably provide enablement for “1,000 microfluidic reactors”. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. The specification is not enabling because it is not clearly stated how 1,000 reactors and channels are being connected.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 1, 4, 5, 13 & 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claims 1 & 4, recitation “*the resistance of each of its upstream channels is at least 10 times larger than the resistance of the downstream channel or channels*” & “*the resistance of all the upstream channels is preferably at least 100 times larger than the resistance of the downstream channels*” render the claims unclear, because it is not specific to the conditions of the fluid, such as temperature, viscosity or flow rate.

Regarding Claim 13, it is unclear how each layer is connected and functions together, in example, are the layers connected horizontally or stacked on to each other. It is also unclear how the inlet/outlet channels are connected to the reactors.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 4 & 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Anderson et al. (PG Pub 2003/0053934).

Regarding Claims 1, 4 & 5, Anderson et al. disclose a microfluidic system (e.g., microfluidic device, Abstract & Fig. 3) comprising first and second fluid supply sources (e.g., one or more inlet microconduits 102, 103, 202, 203, 302, 303, P3/[0029, 0041]), the first and

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second supply sources supplying at least 1000 (see axes of symmetry are n-numbered wherein n is an integer between 2 and ∞ , P5/[0059]) microfluidic reactors (104, 204, 304; P9/[0107]) arranged in parallel (see Fig. 3 & P4/[0047]) via an upstream channel or channels (see Figs. 1, 2), said upstream channel or channels positioned before the microfluidics reactors, the reactors each having at least one downstream channel which is positioned after the reactors (e.g., outlet conduits, 105, 205, 305, P3/[0030]), wherein for all the reactors, the resistance of each of its upstream channels is at least 10 times larger than the resistance of the downstream channel or channels (see P3/[0031-0045], 1. Means for Creating Pressure Drop; also see Claim 5, $\pm 90\%$); and the microfluidic reactors are all identical (see Fig. 3).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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10. Claims 13 & 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. (PG Pub 2003/0053934).

Regarding Claims 13 & 14, Anderson et al. further disclose the microfluidic system the microfluidic system comprising:

- a layer comprising inlet channels (e.g., one or more inlet microconduits 102, 103, 202, 203, 302, 303, P3/[0029, 0041]) for first and second fluid supply source and at least one outlet channel (e.g., outlet conduits, 105, 205, 305, P3/[0030]);
- a plurality of side channels (e.g., distribution channel, P5/[0066] & Fig. 3 (319)) with varying diameter and/or length (see Fig. 3); and
- microfluidic reactors (104, 204, 304; P9/[0107]) which are connected to the connecting channels via a port (e.g., inlet vent, Fig. 3 (322)) and through the connecting channels are in fluid connection with the inlet and outlet channels (see Fig. 3).

Although Anderson et al. teach the device having layers (e.g., lid, P6/[0076]), Anderson et al. fail to disclose the device having 3 layers having channels. It would have been obvious to one having ordinary skill in the art at the time the invention was made to manufacture the device in separate layers to minimize cost of manufacturing from one piece of material, since it has been held that constructing a formerly integral structure in various elements involves only routine skill in the art. *Nerwin v. Erlicnrrnan*, 168 USPQ 177, 179.

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11. Claims 1, 4 & 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allen et al. (WO 01/28670).

Regarding Claims 1, 4 & 5, Allen et al. disclose a microfluidic system (e.g., microfluidic mixer, P3/L19-20 & Fig. 1 (100)) comprising:

- first and second fluid supply sources (e.g., first fluid and second fluid, respectively, P13/L19-20 & Fig. 6 (602, 604)),
- the first and second supply sources supplying microfluidic reactors arranged in parallel (e.g., mixers, P13/L22-23 & Fig. 6 (606, 608)) via an upstream channel or channels (e.g., nozzle channels, P4/L17-18 & Fig. 2a (222, 224)), said upstream channel or channels positioned before the microfluidics reactors,
- the reactors each having at least one downstream channel which is positioned after the reactors (e.g., exit channel, P13/L26, Fig. 6 (614)); and
- the microfluidic reactors are all identical (see identical reactors in Fig. 6 (606)).

Regarding the resistance of its upstream channel at least 10, 100 times larger than the downstream channel, it is noted that the channel width l and nozzle width b (upstream channels) are smaller than the exit channel width m (downstream channels), see Fig. 2a. Therefore, while mixing the same viscosity fluids and the surface of each channels and reactors are made of same material with same surface smoothness, it will display the flow resistance of all the upstream channels of the reactors is higher than the flow resistance in the down stream channels.

Although Allen et al. do not explicitly disclose regarding flow resistance, it is well known in the art of fluid dynamics that varying cross-sectional dimensions result in varying flow rates

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(see evidential reference disclosed in IDS filed on 10/31/2006, Chan et al. (WO 01/57509), P12/L1-4 & Claim 20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the channel dimensions to increase the resistance of upstream channels at least 10, 100 times larger than the resistance of the downstream channels to change the flow rate to modify mixing and reaction rate of fluids. It is further noted that the desired flow resistance a variable that can be modified, among others, by varying the dimensions of the flow channels. For that reason, the flow resistance would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the flow resistance cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the structure of Allen et al. to obtain the desired flow resistance (In re Boesch, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (In re Aller, 105 USPQ 223).

Regarding the number of microfluidic reactors, it is noted that by use of many parallel microfluidic devices, the recited limitation can be met. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to connect a plurality of microfluidic devices, since it has been held that forming in one piece an article which has formerly been in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1993). Further, it would have been obvious to one having

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ordinary skill in the art at the time the invention was made to use 1,000 microfluidic reactors to study multiple reactions in parallel.

Response to Arguments

12. Applicant's arguments filed 12/17/2009 have been fully considered but they are not persuasive.

13. Regarding 112, first paragraph rejection, Examiner maintains the rejection. It is noted that as stated in the specification P7, “...*any number of parallel microfluidic units...*” does not automatically support the claimed 1,000 reactors. Based upon this disclosure, one having ordinary skill in the art could not readily pick any specific number of reactors, such as 1,000 and have a reasonable expectation of success. In addition, it is not clearly disclosed how each layers or the reactors are connected to each other to function, in example, how are they connected and arranged to each other or are 1,000 reactors in one layer or in separate layers. It is advisable to add more structural limitations to the claims.

14. Regarding Allen et al. fail to disclose 1,000 microfluidic reactors, it would have been within the skill of the art to use any number of reactors, such as 1,000.

15. Regarding Allen et al. fail to disclose “*the resistance of each of its upstream channels is at least 10 times larger than the resistance of the downstream channel or channels*” & “*the resistance of all the upstream channels is preferably at least 100 times larger than the resistance of the downstream channels*”, although Allen et al. do not explicitly disclose regarding flow resistance, it is well known in the art of fluid dynamics that varying cross-sectional dimensions result in varying flow rates (see evidential reference disclosed in IDS filed on 10/31/2006, Chan

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et al. (WO 01/57509), P12/L1-4 & Claim 20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the channel dimensions to increase the resistance of upstream channels at least 10, 100 times larger than the resistance of the downstream channels to change the flow rate to modify mixing and reaction rate of fluids. It is further noted that the desired flow resistance a variable that can be modified, among others, by varying the dimensions of the flow channels. For that reason, the flow resistance would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the flow resistance cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the structure of Allen et al. to obtain the desired flow resistance (In re Boesch, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (In re Aller, 105 USPQ 223).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dean Kwak whose telephone number is 571-270-7072. The examiner can normally be reached on M-TH, 5:30 am - 4:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

29Dec09

/D. K./
Examiner, Art Unit 1797

/LYLE A ALEXANDER/
Primary Examiner, Art Unit 1797